

## CLAIMS

What is claimed is:

1. A method of obtaining data from an electromagnetic signal, the method comprising the steps of:

receiving a modulated electromagnetic signal;

sampling the received signal; and

demodulating the signal without mixing the signal with a second electromagnetic signal.

2. The method of claim 1, wherein the step of sampling the signal comprises the step of:

providing an electromagnetic pulse sampling circuit; and

sampling the signal at a rate ranging between about 10 pico-seconds to about 500 pico-seconds.

3. The method of claim 1, wherein the step of sampling the signal comprises the step of:

providing a plurality of electromagnetic pulse sampling cells controlled by a digital computer; and

sampling the signal at a rate ranging between about 10 pico-seconds to about 500 pico-seconds.

4. The method of claim 1, wherein the step of demodulating the signal without mixing the signal with a second electromagnetic signal comprises:

comparing an amplitude of a later signal sample to an amplitude of a previous signal sample.

5. The method of claim 1, wherein the modulated signal is a communication signal selected from a group consisting of: a substantially continuous sinusoidal signal, a plurality of electromagnetic pulses, a plurality of ultra-wideband pulses, a sinusoidal carrier waveform, a spread spectrum signal, a multi-band ultra-wideband signal, an analog signal, and a digital signal.

6. The method of claim 3, wherein each of the plurality of ultra-wideband pulses has duration from about 10 picoseconds to about 100 milliseconds.

7. The method of claim 1, wherein the electromagnetic signal is obtained from a medium selected from a group consisting of: a wireless medium, and a wire medium.

8. A method of obtaining data from an electromagnetic signal, the method comprising the steps of:

receiving an electromagnetic signal containing data;

providing a plurality of electromagnetic pulse sampling cells; and

sampling the received signal; and

comparing an amplitude of a later signal sample to an amplitude of a previous signal sample.

9. The method of claim 8, wherein the step of sampling the received signal comprises sampling the received signal at a sample rate ranging between about 10 pico-seconds to about 500 pico-seconds.

10. The method of claim 8, wherein the received signal is a communication signal selected from a group consisting of: a substantially continuous sinusoidal signal, a plurality of electromagnetic pulses, a plurality of ultra-wideband pulses, a sinusoidal carrier waveform, a spread spectrum signal, a multi-band ultra-wideband signal, an analog signal, and a digital signal.

11. The method of claim 10, wherein each of the plurality of ultra-wideband pulses, or multi-band ultra-wideband pulses has duration from about 10 picoseconds to about 100 milliseconds.

12. The method of claim 8, wherein the electromagnetic signal is obtained from a medium selected from a group consisting of: a wireless medium, and a wire medium.

13. A method of maintaining an electromagnetic signal time reference, the method comprising the steps of:

- receiving the electromagnetic signal having a first synchronization sequence;
- setting a time reference based on the first synchronization sequence; and
- updating the time reference before receiving a second synchronization sequence.

14. The method of claim 13, wherein the step of updating the time reference before receiving the second synchronization sequence comprises the steps of:

sampling the electromagnetic signal at least twice;

calculating a time reference drift of the received signal based on the two samples;

and

shifting the time reference.

15. The method of claim 14, wherein the step of sampling the electromagnetic signal comprises sampling the electromagnetic signal at a sample rate ranging between about 10 pico-seconds to about 500 pico-seconds.

16. The method of claim 13, wherein the electromagnetic signal is a communication signal selected from a group consisting of: a substantially continuous sinusoidal signal, a plurality of electromagnetic pulses, a plurality of ultra-wideband pulses, a sinusoidal carrier waveform, a spread spectrum signal, a multi-band ultra-wideband signal, an analog signal, and a digital signal.

17. The method of claim 16, wherein each of the plurality of ultra-wideband pulses, or multi-band ultra-wideband pulses has duration from about 10 picoseconds to about 100 milliseconds.

18. The method of claim 13, wherein the electromagnetic signal is obtained from a medium selected from a group consisting of: a wireless medium, and a wire medium.

19. An electromagnetic pulse generating system comprising:  
control means for generating a plurality of digital signals;  
electromagnetic pulse generating means for generating a plurality of  
electromagnetic pulses in response to the plurality of digital signals; and  
aggregating means for combining the plurality of electromagnetic pulses.
20. The electromagnetic pulse generating system of claim 19, wherein the  
aggregating means combines the plurality of electromagnetic pulses into a desired  
sinusoidal waveform or into a group of electromagnetic pulses.
21. The electromagnetic pulse generating system of claim 19, wherein the control  
means are selected from a group consisting of: a digital computer microprocessor  
controlled by computer logic, and a finite state machine.
22. The electromagnetic pulse generating system of claim 19, wherein the  
electromagnetic pulse generating means are connected in parallel.
23. The electromagnetic pulse generating system of claim 19, wherein the  
electromagnetic pulse generating means are connected in series.

24. The electromagnetic pulse generating system of claim 19, wherein the aggregating means is selected from a group consisting of: a summing circuit, and a multiplier.

25. A method of transmitting data, the method comprising the steps of:  
receiving data for transmission;  
modulating the data;  
providing an electromagnetic pulse generating circuit;  
generating a plurality of electromagnetic pulses arranged to represent the modulated data; and  
transmitting the plurality of electromagnetic pulses.

26. The method of transmitting data of claim 25, wherein the step of generating a plurality of electromagnetic pulses comprises means for generating a plurality of electromagnetic pulses.

27. A method of obtaining data from an electromagnetic signal, the method comprising the steps of:  
receiving a modulated electromagnetic signal;  
means for sampling the received signal; and  
means for demodulating the signal without mixing the signal with a second electromagnetic signal.